

APRIL/MAY 2024

**GCM14/GCP13/DCM14/DCP13 —
ADVANCED BUSINESS STATISTICS**

Time : Three hours

Maximum : 75 marks



SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Write the limitations of partial correlation analysis.
2. Need for multiple regressions.
3. Define Independent and mutually exclusive events.
4. List out the various approaches to probability.
5. A person throw 10 dice 500 times and obtains 2560 times 4, 5, or 6 can this be attributed to fluctuation of sampling?
6. Write about t-test.
7. List out the two uses of χ^2 distribution in test of significance.

8. Write a note on degree of freedom.
9. Give two examples of Analysis of Variance.
10. Explain – Fisher's F test.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) The simple correlation co efficient between profits (X_1) sales (X_2) and advertising expenditure (X_3) of a factory are $r_{12} = 0.69$, $r_{13} = 0.45$, $r_{23} = 0.58$. Find the partial correlation co efficient $r_{12.3}$ and $r_{13.2}$ and interpret them.

Or

- (b) Is it possible to get the following from a set of experimental data?

(i) $r_{23} = 0.8$; $r_{31} = -0.5$; $r_{12} = 0.6$

(ii) $r_{23} = 0.7$; $r_{31} = -0.4$; $r_{12} = 0.6$

12. (a) A bag contains 30 balls numbered from 1 to 30. One ball is drawn at random. Find the probability that the number of the ball drawn will be a multiple of (i) 5 or 7 and (ii) 3 or 7

Or

takes a random sample from persons attending preview of the new movie, and obtain the following results:

Age group	Under 20	20-39	40-59	60 and above	Total
Liked the movie	146	78	48	28	300
Dislike the movie	54	22	42	22	140
Indifferent	20	10	10	20	60
TOTAL	220	110	100	70	500

What inference will you draw from this data?

20. Perform two-way ANOVA on the data given below:

Plot of land	Treatment			
	A	B	C	D
I	38	40	41	39
II	45	42	49	36
III	40	38	42	42

(Use coding method subtracting 40 from the given number)



17. The following data show the number of seeds germinating out of 10 on damp filter for 80 set of seeds. Fit a binomial distribution to this data:

X: 0 1 2 3 4 5 6 7 8 9 10

Y: 6 20 28 12 8 6 0 0 0 0 0

18. A company arranged an intensive training course for its team of salesmen. A random sample of 10 salesmen was selected and the values (in '000) of their sales made in the weeks immediately before and after the course are shown in the following table:

Salesmen:	1	2	3	4	5	6	7	8	9	10
Sales before:	12	23	5	18	10	21	19	15	8	14
Sales after:	18	22	15	21	13	22	17	19	12	16

Test whether there is an evidence of an increase in mean sales.

19. A movie producer is bringing out a new movie. In order to map out his advertising campaign he wants to determine whether the movie will appeal most to particular age group or whether it will appeal equally to all age groups. The producer

- (b) The odds against student X solving a business statistics problem are 8 to 6, and odds in favour of student Y solving the problem are 14 to 16.

- (i) What is the probability that the problem will be solved if they both try independently of each other?
- (ii) What is the probability that none of them is able to solve the problem?

13. (a) In simple random sample of 600 men taken from a big city 400 are found to be smokers. In another simple random of 900 men taken from another city 450 are smokers. Do the data indicate that there is a significant difference in the habit of smoking in the two cities?

Or

- (b) The height of six randomly chosen soldiers are in inches: 76, 70, 68, 69, 69 and 68. Those of 6 randomly chosen sailors are 68, 64, 65, 69, 72, 64. Discuss the light of the data throw on the suggestions that soldiers are on the average, taller than sailors. Use 't' test.



14. (a) From the data given below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment:

Treatment	Number of patients		
	Favourable	Not favourable	Total
New	140	30	170
Conventional	60	20	80
Total	200	50	250

(Given for degree of freedom = 1 Chi-square 5% = 3.84)

Or

- (b) What are the basic conditions for application of chi-square test?
15. (a) The following data present the yields in quintals of common 10 subdivisions of equal area of two agricultural plots:

Plot 1: 6.2 5.7 6.5 6.0 6.3 5.8 5.7 6.0 6.0 5.8

Plot 2: 5.6 5.9 5.6 5.7 5.8 5.7 6.0 5.5 5.7 5.5

Test whether the two samples taken from two random populations have the same variance (5% point of F for $V_1 = 9$ and $V_2 = 9$ is 3.18)

Or

- (b) The three samples below have been obtained from normal populations with equal variance. Test the hypothesis that the sample means are equal

8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

The table value of F at 5% level of significance for $V_1 = 2$ and $V_2 = 12$ is 3.88

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. The following constants are obtained from measurements on length in mm (X_1) Volume in c.c; (X_2) and weight in gm; (X_3) of 300 eggs:

Mean of $X_1 = 55.95$ $S_1 = 2.26$ $r_{12} = 0.578$

Mean of $X_2 = 51.48$ $S_2 = 4.39$ $r_{13} = 0.581$

Mean of $X_3 = 56.03$ $S_3 = 4.41$ $r_{23} = 0.974$

Obtain the linear regression equation of egg weight on egg length and egg volume. Hence estimate the weight of an egg whose length is 58 mm and volume is 52.5 c.c.